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Vitamin D deficiency may raise allergy and asthma risk in obese children, teens

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One reason why obese children and teenagers are more likely to have hard-to-control asthma and allergies may be vitamin D deficiency, a new study finds. Results of the study will be presented Tuesday at The Endocrine Society's 95th Annual Meeting in San Francisco.

"The increased risk for asthma and allergies, and for more severe cases of allergic disease, in overweight and obese adolescents has not previously been understood," said Candace Percival, MD, lead investigator and a pediatric endocrinology fellow at Walter Reed National Military Medical Center, Bethesda, MD. "However, past research has shown that vitamin D is important for a normal immune system and that vitamin D deficiency is common in obese individuals."

The study, conducted in 86 subjects ages 10 to 18 years, aimed to determine whether vitamin D deficiency plays a role in the increased allergy risk in youth with excess weight.

Fifty-four study subjects were overweight or obese, as determined by their body mass index (BMI) being at or above the 85th percentile for their age and sex on growth charts. The remaining 32 subjects had a healthy weight. For each subject, the researchers calculated the BMI standard deviation, called the BMI Z-score. All subjects had a vitamin D blood test called serum 25-hydroxyvitamin D, and all obese subjects were vitamin D insufficient, Percival said.

She and her team also measured levels of certain hormones called

adipokines that originate in fat cells. Specifically, they assessed leptin and adiponectin, which laboratory and animal studies have shown change with obesity, with leptin becoming elevated and adiponectin decreasing. They evaluated whether these two hormones correlate with vitamin D levels and, in some subjects, with the body's allergy signaling pathways—biochemical measures of allergic disease.

A subgroup of 39 subjects (19 with overweight or obesity and 20 with a healthy weight) underwent blood tests to measure their levels of immunoglobulin E (IgE), which is one of the main players in allergic reactions. Of these 39 subjects, 36 (17 overweight/obese and 19 healthy-weight) also underwent measurements of chemical messengers called cytokines that contribute to allergy and asthma, specifically interleukins (IL) 4, 6, 10 and 13 and interferon-gamma.

The investigators found significant correlations between the severity of the subjects' obesity, the adipokine levels and some biochemical measures of allergic disease. As expected, the higher the BMI Z-score was (indicating greater obesity), the higher the level of leptin and the lower the levels of adiponectin and vitamin D, the authors reported. Obese subjects also had increased levels of IgE, IL-6 and IL-13. However, Percival said, "the relationship between the BMI-Z score and the adipokines and markers of allergic disease seemed to depend on the vitamin D deficiency seen in the more obese patients, leading us to conclude that the increased risk for allergy in obesity may be mediated by vitamin D to some degree."

"This is the first study, to our knowledge, that ties together the relationship of vitamin D deficiency and increased allergy risk and severity in obese and overweight adolescents," she said.

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